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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,180	03/24/2004	Joseph Pierre Heremans	DP-310029	4588
22851	7590	01/21/2009		
DELPHI TECHNOLOGIES, INC.			EXAMINER	
M/C 480-410-202			SALZMAN, KOURTNEY R	
PO BOX 5052				
TROY, MI 48007				
			ART UNIT	PAPER NUMBER
			1795	
			MAIL DATE	DELIVERY MODE
			01/21/2009 PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/808,180

Applicant(s)

HEREMANS ET AL.

Examiner

KOURTNEY R. SALZMAN

Art Unit

1795

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SF/ICE)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Reply

1. Claims 1-7 are currently pending and have been fully considered.

Claim Rejections - 35 USC § 103

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.
3. Claims 1-3, 5, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over SUZUKI et al (US PG PUB 2002/0026856 A1).

Regarding claims 1-3, SUZUKI et al teaches a thermoelectric material with a particle size of 0.5-100 nanometers in the abstract. SUZUKI et al further defines a thermoelectric material as being PbTe in paragraph 4. Since this is the same material as required by the instant application, it would inherently have the same phonon-limited mean free path, as it should be comparable for similar matrix material of a similar size. It would be obvious for the thermoelectric material of SUZUKI et al to inherently have the same mean free path as that of the instant application because they are the same material having the same grain size.

Regarding claim 5, in conjunction with the previous rejection of claim 1, SUZUKI et al also teaches, in paragraph 4, a thermoelectric material to be Bi₂Te₃. Paragraph 16 also discloses the use of the thermoelectric material also being present with their solid solutions.

Regarding claim 7, in conjunction with the previous rejection of claim 1, SUZUKI et al teaches a thermoelectric material of particle size .5-100 nanometers, in the abstract.

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over SUZUKI et al (US 2002/0026856) in view of KUDMAN et al (US 3,737,345)
SUZUKI et al teaches all the limitations of claim 1.

SUZUKI et al fails to teach the any of the materials listed in the instant application.

Regarding claim 4, in conjunction with the previous rejection of claim 1, KUDMAN et al teaches a thermoelectric element comprising, "a body of PbTe and/or PbSe". (column 1, lines 45-47)

At the time of invention, it would have been obvious to one of ordinary skill in the art to use the PbSe material disclosed in KUDMAN et al to make the thermoelectric material of SUZUKI et al, because KUDMAN et al discloses the benefits of the PbSe materials. In column 1, lines 14-19, KUDMAN et al teaches, "Among the most efficient thermoelectric elements for the thermoelectric generation of power at temperatures above 200°C are thermoelectric elements comprising PbTe (lead telluride) and/or PbSe (lead selenide)". The efficiency of

this material as disclosed in KUDMAN et al make the use of them in the thermoelectric material of SUZUKI et al an obvious choice in the art.

5. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over SUZUKI et al, in view of SHARP (US 6,169,245).

SUZUKI et al teaches all the limitations of claim 1.

SUZUKI et al fails to explicitly teach the use of BiSb as a thermoelectric material.

SHARP teaches the use of thermoelectric materials including ternary penta telluride and selenide compounds. SHARP acknowledges, in column 2, lines 33-36, the use of BiSb as a thermoelectric material.

At the time of invention, it would have been obvious to one of ordinary skill in the art to use a BiSb material, as disclosed in SHARP et al, as the thermoelectric material of SUZUKI et al because SHARP et al discloses the use of BiSb as a thermoelectric material known in the art for "thirty or forty years ago", in column 2, lines 33-34. The fact that the BiSb material is established and well known in the art for its thermoelectric capabilities, makes the addition of the BiSb material as disclosed in SHARP and obvious choice as a thermoelectric material as in SUZUKI et al, for its commonly known use in the art.

Response to Arguments

6. Applicant's arguments filed October 27, 2008 have been fully considered but they are not persuasive.

7. Applicant argues on page 7 that since the diameter of the corpuscles is determined by the inert gas pressure in the chamber, "SUZUKI cannot possibly teach or suggest a thermoelectric material where the grain size d is characterized by the relationship $mfp/2 < d < 5mfp$ ".

a. The subject matter of the instant application makes no requirement as to how the size of the thermoelectric material comes to be nano-sized just that the particles be a nanogranular material with the relationship characterized in the claim. Therefore it is unclear from the arguments how the formation of the particles, i.e. the use of pressure to form a processed thermoelectric material in nanogranular corpuscles, causes the thermoelectric material to not be equivalent to material of the instant application.

8. Applicant argues on page 7 that the diameter of the corpuscles in SUZUKI are determined during processing, not prior to processing as required by the claim.

b. Claim 1 of the instant application does not require the diameter to be determined prior to processing but instead teaches the mfp to be the phonon-limited mean free path to be determined from the equivalent bulk thermoelectric prior to processing. The diameter or grain size d is said to be determined once the bulk thermoelectric material is processed, not prior to the processing.

- c. The claim requires the grain size to be relevant only when discussing the final processed thermoelectric nanogranular not the grain size prior to processing.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

10. Any inquiry concerning this communication or earlier communications from the examiner should be directed to KOURTNEY R. SALZMAN whose telephone number is (571)270-5117. The examiner can normally be reached on Monday to Thursday 6:30AM-5PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

krs
1/14/2008

/Kaj K Olsen/
Primary Examiner, Art Unit 1795